

IN THE CLAIMS:

Amend the claims as follows:

Claim 1-152. (Canceled)

153. (New) A method of delivering a payload into the nucleus of a living cell, comprising contacting the cell with a hypercoiling carrier polymer which incorporates, or is otherwise associated with, said payload, wherein said hypercoiling carrier polymer has both hydrophobic regions and hydrophilic regions.

154. (New) A method according to claim 153, wherein said payload forms part of the backbone of said hypercoiling carrier polymer.

155. (New) A method according to claim 153, wherein said payload is tethered to the backbone of said hypercoiling carrier polymer.

156. (New) A method according to claim 153, wherein said hypercoiling carrier polymer is associated with said payload, and forms a complex with said payload.

157. (New) A method according to claim 153, wherein the carrier polymer is biocompatible.

158. (New) A method according to claim 153, wherein the carrier polymer is biodegradable.

159. (New) A method according to claim 153, wherein the carrier polymer is not a vinyl polymer.

160. (New) A method according to claim 153, wherein the carrier polymer has a backbone having amide linkages.

161. (New) A method according to claim 153, wherein the carrier polymer has a backbone having ester linkages and amide linkages.

162. (New) A method according to claim 153, wherein said hypercoiling carrier polymer has both hydrophobic regions and hydrophilic regions, and wherein said hydrophobic regions and hydrophilic regions alternate along the length of the backbone of the carrier polymer.

163. (New) A method according to claim 153, wherein said carrier polymer has from 10 to 500 hydrophilic regions.

164. (New) A method according to claim 153, wherein said carrier polymer has from 10 to 500 hydrophobic regions.

165. (New) A method according to claim 153, wherein the ratio of hydrophilic regions to hydrophobic regions, by number, for the carrier polymer is from about 0.2 (1:5) to about 5 (5:1).

166. (New) A method according to claim 153, wherein each hydrophobic region has a gram molecular weight of from about 14 to about 1000.

167. (New) A method according to claim 153, wherein each hydrophilic region has a gram molecular weight of from about 16 to about 1000.

168. (New) A method according to claim 153, wherein said carrier polymer and said payload have a combined molecular weight of from about 1 kDa to about 1 MDa.

169. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophobic moieties are selected from moieties derived from:

- (a) an alkane, having from 1 to 20 carbon atoms;
- (b) an alkene or an alkyne having from 2 to 20 carbon atoms;
- (c) a cycloalkane, a cylcoalkene, or a cycloalkyne, having from 3 to 20 carbon atoms;
- (d) a carboarene having from 6 to 20 ring carbon atoms;

(e) a heteroarene having from 5 to 20 ring atoms;
(f) a heterocycle having from 5 to 20 ring atoms;
(g) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a carboarene as defined above;
(h) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a heteroarene as defined above; or,
(i) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a heterocycle as defined above.

170. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophobic moieties are selected from:

moieties derived from compounds of the formula:

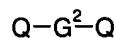


wherein:

G^1 is a hydrophobic group; and

Q is independently a reactive functional group; and

moieties derived from compounds of the formula:



wherein:

G^2 is a hydrophobic group; and

each Q is independently a reactive functional group;

wherein said hydrophobic group, G¹ or G², is selected from moieties derived from:

- (a) an alkane, having from 1 to 20 carbon atoms;
- (b) an alkene or an alkyne having from 2 to 20 carbon atoms;
- (c) a cycloalkane, a cylcoalkene, or a cycloalkyne, having from 3 to 20 carbon atoms;
- (d) a carboarene having from 6 to 20 ring carbon atoms;
- (e) a heteroarene having from 5 to 20 ring atoms;
- (f) a heterocycle having from 5 to 20 ring atoms;
- (g) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a carboarene as defined above;
- (h) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a heteroarene as defined above; or,
- (i) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a heterocycle as defined above; and

said reactive functional group, Q, or each of said reactive functional groups, Q, is selected from:

- (i) reactive acyl groups;
- (ii) hydroxy groups; and,
- (iii) amino groups; and

said reactive acyl group, -C(=O)X, is selected from:

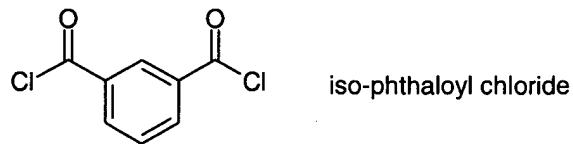
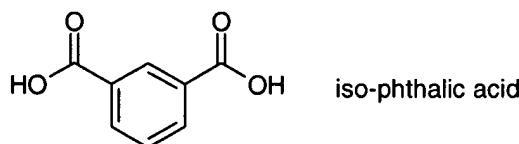
- (a) carboxylic acid, where X is -H;
- (b) acyl halides, where X is halogen;

(c) acid anhydrides, where X is -OC(=O)R^{AN}, wherein R^{AN} is an acid anhydride substituent;

- (d) esters, where X is -OR^E, wherein R^E is an ester substituent.

171. (New) A method according to claim 170, wherein said hydrophobic group, G¹ or G², is derived from benzene.

172. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophobic moieties are selected from moieties derived from the following compounds:



173. (New) A method according to claim 170, wherein said hydrophobic group, G¹ or G², is derived from:

- (a) an alkane, having from 1 to 20 carbon atoms.

174. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophobic moieties are selected from moieties derived from the following compounds, wherein p is an integer from 1 to 10:



175. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties is a weak Bronsted acid characterized by pK_a values in the range of about 3 to about 8.

176. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties is a weak Bronsted base characterized by pK_a values in the range of about 5 to about 12.

177. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties bears a carboxylic acid group or a salt thereof.

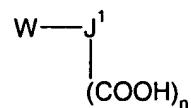
178. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties bears an amino base group selected from:

- a primary amino group (-NH₂);
- a pendant secondary amino group (-NHR);
- a non-pendant non-cyclic secondary amino group (-NH-);
- a cyclic secondary amino group (-NH-);
- a pendant tertiary amino group (-NR₂);
- a non-pendant non-cyclic tertiary amino group (-NR- or -N=); or
- a cyclic tertiary amino group (-NR- or -N=);

or a salt thereof.

179. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties are selected from:

moieties derived from compounds of the formula:



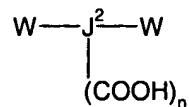
wherein:

J² is core group;

n is an integer from 1 to 4; and,

W is independently a reactive functional group; and

moieties derived from compounds of the formula:



wherein:

J^2 is core group;

n is an integer from 1 to 4; and,

each W is independently a reactive functional group; and

wherein said core group, J^1 or J^2 , is selected from moieties derived from:

(a) an alkane, having from 1 to 20 carbon atoms;

(b) an alkene or an alkyne having from 2 to 20 carbon atoms;

(c) a cycloalkane, a cylcoalkene, or a cycloalkyne, having from 3 to 20

carbon atoms;

(d) a carboarene having from 6 to 20 ring carbon atoms;

(e) a heteroarene having from 5 to 20 ring atoms;

(f) a heterocycle having from 5 to 20 ring atoms;

(g) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a carboarene as defined above;

(h) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a heteroarene as defined above; or,

(i) an alkane, an alkene, an alkyne, a cycloalkane, a cylcoalkene, or a cycloalkyne, as defined above, attached to a heterocycle as defined above; and

wherein said reactive functional group, W, or each of said reactive functional groups, W, is selected from:

- (i) reactive acyl groups;
- (ii) hydroxy; and,
- (iii) amino groups.

180. (New) A method according to claim 179, wherein J¹ and/or J² is independently a core group derived from an alkane having from 1 to 10 carbon atoms.

181. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties are selected from moieties derived from amino acids.

182. (New) A method according to claim 153, wherein exactly one, one or more, more than one, or all, of the hydrophilic moieties are selected from moieties derived from the following compounds: 2,4-diaminopropionic acid; 2,4-diaminobutyric acid; ornithine; lysine; 2,6-diaminopimelic acid.

183. (New) A method according to claim 153, wherein one or more of the hydrophobic moieties of the carrier polymer are independently a hydrophobically-modified hydrophilic moiety.

184. (New) A method according to claim 153, wherein the carrier polymer is a co-polymer of:

- (a) a monomer selected from iso-phthalic acid and iso-phthaloyl chloride; and,
- (b) a monomer selected from 2,4-diaminopropionic acid; 2,4-diaminobutyric acid; ornithine; lysine; or 2,6-diaminopimelic acid.

185. (New) A method according to claim 184, wherein the carrier polymer is poly(lysine iso-phthalamide).

186. (New) A method according to claim 153, wherein one or more of the payload moieties are, or comprise, biologically active agents selected from:

- (a) drugs, prodrugs, chemo-therapeutics, radio-therapeutics, neutron capture agents;
- (b) peptides, proteins, antibodies, antibody fragments, enzymes, transcription factors, signalling proteins, antisense peptides, zinc fingers, peptide vaccines; and,
- (c) nucleotides, oligonucleotides, plasmids, nucleic acids.

187. (New) A method according to claim 153, wherein one or more of the payload moieties are, or comprise, detectable labels selected from:

- (a) fluorophores;
- (b) chromophores;
- (c) isotopically enriched species;
- (d) paramagnetic species;
- (e) radioactive species; and,
- (f) scintillents and phosphors.

188. (New) A method according to claim 153, wherein one or more of the payload moieties is a cyanine dye or a derivative thereof, a chelating group capable of complexing with a detectable label, a drug, or a boron-containing moiety, or one or more of the payload moieties is, or comprises, a peptide, a nucleic acid, or a cationic nucleic acid complex.

189. (New) A method according to claim 153, wherein the carrier polymer further comprises other regions and/or moieties selected from: spacer groups, water solubilizing groups, and targeting ligands.

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190. (New) A method according to claim 153, wherein the carrier polymer further comprises water solubilizing groups selected from: polyethylene glycol (PEG), poly ethylene oxide (PEO), polyvinyl alcohol (PVA), hydroxylpropylmethyl alcohol (HPMA), and dextran groups.

191. (New) A method of treatment of a condition comprising administering to a patient suffering from said condition a therapeutically-effective amount of a hypercoiling carrier polymer which incorporates a payload, or which is otherwise associated with a payload, as described in claim 153, wherein said payload is a drug which treats said condition.

192. (New) A method of diagnosis of a condition comprising:

- (a) administering to a patient an effective amount of a hypercoiling carrier polymer which incorporates a payload, or which is otherwise associated with a payload, as described in claim 153, wherein said payload is, or comprises, a detectable label;
- (b) detecting the presence and/or location of said detectable label; and
- (c) correlating said presence and/or location with said condition.

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193. (New) A method of imaging a cell comprising:

(a) contacting a living cell with a hypercoiling carrier polymer which incorporates a payload, or which is otherwise associated with a payload, as described in claim 153, further wherein said payload is, or comprises, a detectable label; and

(b) detecting the presence and/or location of said detectable label;

and optionally:

(c) forming an image of said cell using said presence and/or location

data.

194. (New) A method of imaging a patient, or a portion thereof, comprising:

(a) administering to said patient an effective amount of a hypercoiling carrier polymer which incorporates a payload, or which is otherwise associated with a payload, as described in claim 153, further wherein said payload is, or comprises, a detectable label; and

(b) detecting the presence and/or location of said detectable label;

and optionally:

(c) forming an image of said patient, or portion thereof using said presence and/or location data.